

Small Off-Road Engine Exhaust Emission Standards (≤ 19 kW), HC+NO_x / CO / PM in g/kW-hr

Displacement Category	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Displacement Category	2005	2006	2007	2008	2009	2010	2011	2012	2013+	
< 20 cc	HC: 295 / NOx: 5.36 / CO: 805					72 / 536 / 2.0 ^b					< 50 cc	50 / 536 / 2.0 ^b									
≥ 20cc - < 50cc	HC: 241 / NOx: 5.36 / CO: 805																				
≥ 50cc - ≤ 65cc	HC: 161 / NOx: 5.36 / CO: 402										≥ 50cc - ≤ 80cc	72 / 536 / 2.0 ^b									
> 65cc - < 225cc	16.1 402 1.2 ^a	16.1 / 467 / 1.2 ^a				16.1/467/-	16.1 / 549 / - Horizontal-shaft	> 80cc - < 225cc Horizontal-shaft	16.1 / 549 / -		10 / 549 / -										
							16.1 / 467 / - Vertical-shaft	> 80cc - < 225cc Vertical-shaft	16.1 / 467 / -												
≥ 225 cc	13.4 402 1.2 ^a	13.4 / 467 / 1.2 ^a				13.4/467/-	12.1 / 549 / -		≥ 225 cc	12.1 / 549 / -					8.0 / 549 / -						

a) HC+NO_x, CO and PM standards applicable to all diesel-cycle engines. PM standard is not applicable to spark-ignition engines.

b) PM standard applicable to all two-stroke engines.

Small Off-Road Engine Voluntary Emission Standards (Blue Sky Series engine requirements), HC+NO_x / CO / PM in g/kW-hr

Displacement Category	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Displacement Category	2005	2006	2007	2008	2009	2010	2011	2012	2013+	
—											< 50 cc	25 / 536 / 2.0 ^a									
											≥ 50cc - ≤ 80cc	36 / 536 / 2.0 ^a									
											> 80cc - < 225cc	—			5.0 / 549 / -						
											≥ 225 cc				4.0 / 549 / -						

a) Applicable to all two-stroke engines

Small Off-Road Engine Evaporative Emissions - Performance and Design Standards

Displacement Category	Requirements		2006	2007	2008	2009	2010	2011	2012	2013+	
≤ 80cc	Fuel Tank Permeation g ROG/m ² /day		-	2							
Walk-Behind Mowers > 80cc - < 225cc	Performance Requirements ^a	Diurnal Standard Grams HC/day	-	1.3		1.0					
	Design Requirements	Fuel Hose Permeation g ROG/m ² /day	15	-					-		
Non Walk-Behind Mowers > 80cc - < 225cc	Performance Requirements ^a	Diurnal Standard Grams HC/day	-	1.20 + 0.056 × tank vol.(L)					0.95+0.056×tank vol.		
	Design Requirements	Fuel Hose Permeation g ROG/m ² /day	15								
		Fuel Tank Permeation g ROG/m ² /day	-	2.5					1.5		
		Carbon Canister or Equivalent Butane Working Capacity Grams HC	-	1.4 g/L (tanks ≥ 3.78L) or 1.0 g/L (tanks < 3.78L)							
≥ 225cc ^b	Performance Requirements ^a	Diurnal Standard Grams HC/day	-		1.20 + 0.056 × tank vol.(L)						
	Design Requirements	Fuel Hose Permeation g ROG/m ² /day	15								
		Fuel Tank Permeation g ROG/m ² /day	-		2.5					1.5	
		Carbon Canister or Equivalent Butane Working Capacity Grams HC	-		1.4 g/L (tanks ≥ 3.78L) or 1.0 g/L (tanks < 3.78L)						

a) For model year 2006 only, all engines and equipment with displacements > 80 cc - < 225 cc must comply with the fuel hose permeation design requirement. Engines and equipment with displacements ≥ 225 cc must comply with the fuel hose permeation design requirement for model years 2006 and 2007 only.

b) Small production volume engines or equipment are exempted from the diurnal standards and the fuel tank permeation standard. In addition, these engines or equipment are not required to be configured with low permeation fuel hoses and carbon canisters until model year 2010.

Small Off-Road Engine Fuel Cap Performance Standards

Effective Date Model Year	Applicability
2007	Fuel Caps For All SORE Equipment With Small Off-Road Engines > 80 cc to < 225 cc
2008	Fuel Caps For All SORE Equipment With Small Off-Road Engines ≥ 225 cc

Small Off-Road Engine Optional Permeation Rate Standard

Effective Date Model Year	Applicability	Requirement ^a Tank Permeation
2007	Equipment That Use Gasoline Powered Small Off-Road Engines With Displacements < 80 cc	Fuel Tank Permeation Emission Shall Not Exceed 1.0 Grams Per Square Meter Per Day As Determined By TP-901

a) Permeation rate must be measured to two significant digits

Small Off-Road Engine Optional Evaporative Emission Standards (Grams per 24-hour diurnal test)

Effective Date Model Year	Applicability	Requirement ^a Tank Permeation
2007	All Equipment That Use Small Off-Road Engines With Displacements > 80 cc To < 225 cc	Diurnal Emissions Shall Not Exceed 0.5 Grams Total Hydrocarbons Per Day As Determined By TP-902
2008	All Equipment That Use Small Off-Road Engines With Displacements ≥ 225 cc	Diurnal Emissions Shall Not Exceed 1.0 Grams Total Hydrocarbons Per Day As Determined By TP-902

a) Permeation rate must be measured to two significant digits